Proposal Reviews

#212: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

University of California, Davis

Final Selection Panel Review	
Initial Selection Panel Review	
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Prior Performance/Next Phase Funding	
Environmental Compliance	
Budget	

Final Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Final Selection Panel Review

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Please provide an overall evaluation rating.

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**X**

Amount: **$1,863,601**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None.

Provide a brief explanation of your rating:

Letters from the applicant, the Sacramento River Watershed Program, the California Dried Plum Board, and a farm consulting firm recommended funding for the proposal and disputed several remarks in regional and technical reviews of the project. The Selection Panel, however, stands by its initial recommendation not to fund this project at this time. The Selection Panel did not consider the work proposed to be duplicative, but did agree with the Technical Panel concerns regarding the availablity of analytical methods to relate the pesticides of concern to aquatic toxicity. The Panel recognizes the importance and need for this work, but believes that a coordinated effort to address surface water toxicity resulting from pesticide use is needed. CALFED intends to convene a workshop to address this issue and welcomes the participation of the applicant in this future effort.

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**X**

Amount: **$0**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None.

Provide a brief explanation of your rating:

The Selection Panel concurs with the review of the Technical Panel that this is a highly relevent research project that if successful would provide useful information to landowners, regulators and resource managers. However, there were substantive reservations that the project could be fully conducted due to the applicability of some of the analytical methods and the ability of other methods to make the link between new farm mangement practices and surface water quality and biotoxicity.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Superior	**Overall, important research aimed at important questions concerning practices to reduce pesticide runoff and entry in the region's waters with resulting risks to wildlife. There are similar questions raised (as for a companion proposal) concerning analytical methodologies. If the deficiencies in analytical chemistry support were addressed, this proposal would be rated higher.**
-Above average	
XAdequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   The proposed studies encompass broad goals and diverse scientific specialties with respect to pesticide use and water quality, including the use of organophosphates and pyrethroids, measurements of pest control efficacy, evaluation of the toxic potential of orchard runoff based on chemical analysis and pesticide toxicity studies on aquatic organisms, hydrologic studies on the effects of ground treatment and soil water management on orchard runoff, and design and implementation of various application and deposit technologies for pesticides. A successful project of this nature is clearly justified.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

Agency staff, watershed stakeholder groups, and growers have all expressed a need for this type of study and have offered their endorsement. However, as in a companion proposal, there are serious issues raised as to the ability of the proponents to reliably measure the compounds of interest, and the absence of strong analytical chemistry support is seen as a significant impediment to success. It is expected that the analytical challenges will not be as daunting as in the companion proposal because much of the work will be focusing on measuring the comparatively higher levels of pesticides expected in runoff water from agricultural plots.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   This was seen to be a highly relevant research project, and successful promulgation of the research would be very useful to management practices and decision makers in the region. However, as noted above, there are substantive reservations about whether this project could be fully conducted, due to questions about analytical methods. Additionally, the toxicity tests (acute LC50s) are crude tests, and lack of an effect in those tests cannot be taken as an indication of no environmental impact.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget for this project was generally seen as being reasonable.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   This proposal was ranked low by one region, medium by another, and high by yet another. A major question was whether this work was highly duplicative of earlier work by the same PI, and whether earlier results from that similar work had been evaluated. However, no prior performance issues were noted administratively.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   No prior performance or environmental compliance issues were raised, and one minor budget issue regarding overhead rates.

Miscellaneous comments:

None

Delta Regional Review:

Proposal Number: 212

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Overall Ranking: **-**Low **X**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Seems to be very similar to another CALFED Funded project on orchard runoff. The methods were developed in another CALFED Study. The study does not mention the crack down on diazinon and chlorpyrifos by the EPA. The relative toxicity of these may be mute in a very short while. Household use of these will be virtually eliminated. Ag uses are being trimmed back. The regional panel favors environmental water quality projects that demonstrate practical clean water protection and that provide the information most likely to be helpful in making decisions about clean water policy and action in the Delta and its tributaries.

The proposal has these elements. CALFED Staff needs to evaluate what has been proposed in the past and what has been submitted.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Seems to be very similar to another CALFED Funded project on orchard runoff. The methods were developed in another CALFED Study. The study does not mention the crack down on diazinon and chlorpyrifos by the EPA. The relative toxicity of these may be mute in a very short while. Household use of these will be virtually eliminated. Ag uses are being trimmed back.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Controls (BMPs) runoff to local streams and therefore reduces Aquatic Toxicity.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

Much of this work was supposed to have been done in a previous CALFED study. This work is directly tied to toxicity studies done by DFG with CALFED funds.

4. Does the project adequately involve local people and institutions?

   -Yes **X**No

   How?

   Most of the work is done by university students and researchers. Needs workshops or teaching venues to be effective.

Other Comments:

Much of this work is similar to the work funded in project 97-C12. The PI is the same. CALFED staff should examine the proposed products of 97-C12 and compare them to the deliverables submitted by the PI and the deliverables specified in this proposal.

San Joaquin Regional Review:

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

The committee recommends a high ranking due to the need for research dealing with pesticides and their introduction to the delta system. Research in the past has delt with older pesticides and current new registrations have introduced new chemistries that need research and evaluation as to their effects as well as elimination from waters running into the delta.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   This project is a coordination between the University of California and its extension service in relationship to the local farm community along riparian areas.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Primarily this is a project that addresses water quality in the delta.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   This project continues efforts by the University to effectively eliminate harmful consitutents from the delta environment.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

How?

The project works directly with landowners along rivers and local farm advisors.

Other Comments:

none

Sacramento Regional Review:

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

The proponent has received a 1999 and a 2000 grant totalling $2 million for similar work. A technical group has not yet been formed. While the project has many good qualities, the panel felt this project may be duplicative and needs to wait until more information and work has been done on the other projects.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   No local constraints. Builds on past project and another current CALFED proposal by Dr. Weston of UCB. Strong presence in local areas and relationships already developed with growers, ag businesses and Coop Ext. advisors.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Meets PSP priorities MR-4, SR-7, SJ-5, DR-6. Also "Other Stage 1 Actions" to reduce contaminants (perst) from ag lands. DR-6 specifically addresses potential problems with pyrethroid use. Compares effectiveness of several alternative practices as adaptive management experiments within multiple regions.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   Sac River Watershed Program is an active supporter.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   Full range of involvement, mainly at the dissemination phase. The information and practical results of this project are highly desired by farmers, ag advisors, chemical and spray equipment mfgs., and restorationists.

Other Comments:

Positives: Strong project addressing this PSP's concerns and info gaps re: pesticide use effects and alternative practice feasibility. Links to former and another proposal this round. Infrastructure in place so no start-up costs related to staffing up.

There was a strong concern, however, from panel members that this may be duplicative work of projects already funded by Prop 13 and CALFED Watershed funding, with inadequate data to yet determine whether this project is needed.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **212**

Applicant Organization: **University of California, Davis**

Proposal Title: **Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**I would like to see a follow up to this groups work on integrated pest management, and the general approach seems valid - however, I don't see what can be learned without some reliable chemistry - this group seems far enough away from environmental chemistry that I'm not confident that they would be able to bring in an appropriate analyst to help them solve their problems.**
-Good	
XPoor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Overall goals are important and clear to this reviewer; this appears to be a very timely issue as little is known about how to minimize pesticide run-off

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

I would say that this work is largely research with an elements of a demonstration project

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   I found the approach to be a little vague with respect to which parameters would be varied in what way - the conceptual approach to sampling storm events with automated systems is conceptually sound but the problems are in the analytical details

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   However, it appears to me that it will be difficult for the project to be successful unless pesticides can be analytically measured (biological endpoints are too indirect/risky in all likelihood) during run-off events. Therefore, I limit my critique to the pesticide chemistry component of the project which I find to be wholly inadequate.

   One of the reasons that so little is known about pesticide run-off (especially for pyrethroids) is that good studies are challenging to conduct both logistically (the proposed research has done a pretty good job with the logistics) and by difficult analytical sampling and analysis issues. The proposed sampling and analysis is inappropriate and inadequate in my view for the following reason:

   1. the PI's have little experience with trace or ultratrace analyis 2. the stated detection limits of their methods (if they worked) are several orders of magnitude above the LC50 values for aquatic invertebrates exposed to permethrin or pyrethroids more related to ensfenvalerate (down to very low ng/L) - I'm less familiar with the OP literature but again the detection limits are too high (need to be low ug/L) to then be related to any observed toxicity. 3. it is unclear whether the time series sampler bottles will be ad/absorptive to analytes or whether they will need to be poisoned/acidified/etc for pesticide to be stable between sampling and collection; 4. the membrane filtration unit will most certainly remove most dissolved pyrethroid and possibly OP from solution; 5. no pesticide metabolites will be monitored; a more likely?? source of exposure than the parent pesticides, at least for some of them - thus diagnostics for any observed toxicity will be limited.

   The bottom line is that these are very difficult analyses for the most seasoned and expert analyst - I don't think that this team can do the chemistry - in theory it might be possible to calibrate a series of in-situ biomonitors/biomarkers to examine some measure of integrated exposure, but this would not be trivial and was not proposed.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Performance measures may be difficult to interpret even if the analytical chemistry problems can be worked out - the ultimate success would depend upon whther growers implemented suggested improvements and in turn the watershed becomes less contaminated with pesticides

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   If the investigators could adequately make the measurements needed, it is likely that there will be useful results; I would feel more assured if there have been previous studies of this type that have yielded valuable answers.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   This is a very experienced research team in every area except two: analytical chemistry and environmental engineering realted to fate and transport studies/interpretation. The conceptual description of the transport model indicates that both the state of knowledge in the field is probalby weak (which I had guessed before reading this work) and that the PI's have little direct understanding of the tranport modeling involved (the latter is not in my opinion a fatal flaw as phenomenological results/understandings would be almost as usefule in this case).

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   It is difficult for me to judge the budget as this sort of integrated study is outside of my experience

Miscellaneous comments:

It seems to me that there needs to be much more effort placed on this type of study (unfortunately studies that are very expensive in nature and also require a lot of planning, of the type that this group has done a lot of). However, I don't see the value in funding this group to do transport work when they don't have a clue concerning the analytical chemistry and also have no real transport/fate modeling understanding.

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **212**

Applicant Organization: **University of California, Davis**

Proposal Title: **Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**This project will provide information on alternative pest control procedures that reduce off-site movement of pesticides. Some aspects of the research approach are somewhat confusing. It would help if the PIs provided diagrams of the experimental setup, and more clearly articulate the need for and use of the hydrologic modeling efforts (why do you need a hydrologic model if the amount and toxicity of runoff is measured?) Without this information, it is difficult for me to assess the validity of their approach. For the research products from this proposal to be of value, the PIs need to effectively communicate their findings to orchard growers. There is not a clear outreach plan in this proposal.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals in this proposal are clearly stated. The PI's plan to focus on (verbatim from proposal) "determining the efficiacy of various alternative pest control measures, site management practices to reduce off-site pesticide movement, and newer application technology and formulations that result in lower pesticide application rates and reduced offsite pesticide movement within the Sacramento and San Joaquin River watersheds." This

proposal thus specifically addresses the priorities of the CALFED program to reduce impacts of pesticides through development and implementation of Best Management Practices.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   This project appears to be justified, although more a clearer explanation of research methods is needed to adequately review this proposal.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Some aspects of the research approach are somewhat confusing. It would help if the PIs provided diagrams of the experimental setup, and more clearly articulate the need for and use of the hydrologic modeling efforts (why do you need a hydrologic model if the amount and toxicity of runoff is measured?) Without this information, it is difficult for me to assess the validity of their approach.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   See above - I would like further documentation on research methods to assess if the project is technically feasible and likely to be successful.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The performance measures are restricted to presentations and publications. While this may be appropriate for a research project, I see this effort as more applied in that it seeks to identify improved methods for decreasing off-site movement of pesticides. This is only one step away from orchard growers adopting alternative pest control procedures. Thus, the ultimate measure for success should be if orchard growers use the new technologies that emerge as being superior in this project.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   This project will provide information on alternative pest control procedures that reduce off-site movement of pesticides. For this information to be of value, the PIs need to effectively communicate their research findings to orchard growers. There is not a clear outreach plan in this proposal.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

There was not too much information provided on the success of the PIs previously funded CALFED project. Some of the research goals in the previously funded effort appear to be remarkably similar to those in the present proposal, which may indicate that the PIs were unsuccessful in completing their research objectives. There is insufficient information to assess this, however.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget appears reasonable.

Miscellaneous comments:

None.

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **212**

Applicant Organization: **University of California, Davis**

Proposal Title: **Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**This proposal falls between excellent and good, however, the previous track record of the applicants under CALFED pushes the rating to the upper category.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Rating: Very Good

   The proposed studies encompass broad goals and diverse scientific specialties with respect to pesticide use and water quality, including the use of organophosphates and pyrethroids, measurements of pest control efficacy, evaluation of the toxic potential of orchard runoff based on chemical analysis and pesticide toxicity studies on aquatic organisms, hydrologic studies on the effects of ground treatment and soil water management on orchard runoff, and design and implementation of various application and deposit technologies for pesticides.

Hypothesis #4: "some alternative pesticides have toxicity potentials in aquatic environments that are a function of water chemistry (pH, DO, turbidity etc.) is not addressed in the Approach section.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Rating: Excellent

   This proposal describes research aimed at exploring alternative pest control measures, site management practices, and pesticide application technologies and formulations which are designed to help reduce pesticide application rates and off-site pesticide movement within the Sacramento and San Joaquin river watersheds. This is especially important in a watershed in which there are elevated levels of contaminants, such as diazinon and chlorpyrifos.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Rating: Good Very Good

   Agency staff, watershed stakeholder groups, and growers have all expressed a need for this type of study and have offered their endorsement. Also, the adaptive strategy of this proposal, and the planned outreach activities and ongoing communication with the agricultural community, provides flexibility to address emerging issues of concern.

   The monitoring of the efficacy of the alternative management practices is as important as the identification and execution of the test practices themselves. Included in the monitoring phase are chemical analyses of pesticide runoff. However, the detection limits of 0.5 mg/L for diazinon (organophosphate) and 0.2 mg/L for esfenvalerate (pyrethroid), if stated correctly, are poor. In addition, filtering of runoff water to remove soil particles could serve to remove a significant portion of pesticide if much of it is adsorbed to suspended particles, thus giving a skewed indication of pesticide occurrence (or toxicity potential) in runoff water. Also included in the monitoring phase are bioassays, designed to test the toxic potential of the pesticide runoff. The proposal includes testing only of the acute toxicity of runoff to EPA bioassay species, such as larval fathead minnows and rainbow trout, a daphnid and a chironomid species, and one indigenous cladoceran. Because pyrethroids are known to be especially toxic to fish, care should be taken in choosing sensitive fish species for toxicity studies, and fish that are resident in the Sacramento and San Joaquin river watersheds. Also, sublethal effects on fish may be very important, but are not addressed here. Behavioral effects are an especially appropriate sublethal endpoint to evaluate when studying organophosphates and pyrethroids, due to the neurotoxicity of these compounds.

   The Pesticide Toxicity Studies section purports to "evaluate toxicity of variouspesticides". There are few or no details here on the nature of the toxicity testing (acute versus sublethal, which endpoints will be tested, which specific species will be tested, references for testing protocols), thus making an evaluation of this part of the proposal rather difficult. However, these details may be important in the context of identifying various pesticides to test in field studies. Also, it is not clear to what extent the work will focus on organophosphates versus pyrethroids in the hydrologic studies and application and formulation studies.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Rating: Excellent

   The research team that will be working on this project includes scientists with a diversity of scientific expertise and strong professional records of success. These qualities are key for maximizing the success of a project of this scale.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Rating: Excellent

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Rating: Very Good

   The final research product: "demonstrating the characteristics and toxicity potentials of existing and emerging pesticides with regard to their toxicity potentials when mixed" is not addressed in the Approach section. Also, the final research product that deals with toxicity to native species is not adequately addressed in the Approach section.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Rating: Excellent

   The strengths of this proposal include the well established liaisons and close cooperation between the proposal applicants and the extended agricultural community, including plans to link the proposed field studies with three demonstration projects already in place to address implementation of alternative practices.

   This research team is currently operating on a one year budget augmentation to a previously awarded three year contract with CALFED (Contract #B-81609, Project #97-C12). The previous contract also dealt with the exploration of alternative agricultural practices designed to reduce offsite movement of pesticides, as well as the design and initiation of monitoring strategies for evaluating the success of these alternative practices. This project not only yielded the expected products, but also came under budget and culminated in the design and building of field monitoring apparatus that will continue to be used in the current proposal for evaluating the efficacy of reducing pesticide runoff into surface waters.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Rating: Very Good

Miscellaneous comments:

External Scientific: #4

Research and Restoration External Scientific Review Form

Proposal Number: **212**

Applicant Organization: **University of California, Davis**

Proposal Title: **Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**This is a strong proposal. The goals and objectives are clearly stated and are consistent with the procedures described in the proposal. Research and outreach products should contribute significantly to meeting the objectives of the project. There appears to be an appropriate infrastructure to leverage the diverse expertise of the applicants to meet the objectives of the proposal.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals and objectives are clearly stated and are consistent with the procedures described in the proposal.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Concern for OPs in Californias Central Valley surface water has been an issue for a number of years. There is specific concern for pesticide use during the delay dormant season for orchard crops because it is during this period that there is significant rainfall in the valley. In addition, during this period trees are either bare or without significant foliage, increasing the potential for off-target drift.

OP use in agriculture is generally on the decline. Concern now shifts to OP replacements and alternative pest management strategies. The synthetic pyrethroids are known replacements for OPs for insect pest management during the delayed dormant period. These compounds can be highly toxic to aquatic life. With reduced OP use, synthetic pyrethroid use may increase significantly. Consequently, it is important to evaluate Central Valley pest management strategies that employ the synthetic pyrethroids to determine the potential for adverse impact on aquatic systems.

The proposed work will bridge previous work by evaluating the OP diazinon and the synthetic pyrethroid esfenvalerate. The hypotheses to be tested are clearly stated. They include factors that may influence pesticide movement with runoff (timing of application relative to rainfall, vegetation, soils, application equipment, and practices). In addition, they hypothesize that for some pesticides, toxicity may be influenced by the media (water, sediment, and vegetation) and by water chemistry. In addition, bioassays will be employed to evaluate the efficacy of various BMPs to reduce surface water loading. This is a very broad approach to studying the problem, requiring expertise across a number of disciplines. Success will require a concerted effort on the part of the collaborators to periodically evaluate research progress and convey these findings to other participants.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

Procedures to evaluate factors that may influence pesticide movement with runoff (timing of application relative to rainfall, vegetation, soils, application equipment and practices) are well defined. Those components that involve field work are subject to the usual concerns regarding environmental research. Are the field sites representative of production practices in the Central Valley? Will the weather conditions that prevail during this research be representative, i.e., can the results be extrapolated to a variety of conditions that may lead to off-site pesticide movement in runoff? Comparison of leaching and runoff soils is an interesting approach and may be useful within limits. However, soils with serious drainage problems are often tiled. Tile drainage also has the potential to move pesticides into surface water, but more importantly, tiled fields with heavier soils may act like the lighter leaching soils and retain pesticides in the soil column and unavailable for runoff. The use of a rainfall simulator, while allowing more experimental control, has the drawback of only simulating rainfall. Such an approach is most useful in evaluating the relative loss with runoff of a series of pesticides, and less useful in estimating actual loss with runoff-producing rainfall events. The field experiments concentrate on edge-of-field loss, whereas the impact on aquatic life and aquatic ecosystems is best described at a watershed scale. For example, they will test the hypothesis that application timing relative to rainfall can influence pesticide movement into surface water with runoff. In addition to timing, what is also critical is the total amount of pesticide used within the watershed. Because the water will be filtered to remove particulates before extraction, the chemical analysis proposed is for dissolved residues only. This may be sufficient for diazinon as a majority of the residues will be in the dissolved fraction, but esfenvalerate has a very low water solubility and a significant fraction will partition to the suspended sediment. Will the filtered sediment be measured to aid in the evaluation of the

dissolved residue data? Is it assumed that only dissolved residues are biologically significant? In addition, how will edge-of-field pesticide concentrations be evaluated with regards to the dynamics of exposure throughout the surface water ecosystem, i.e., how will relatively high concentrations measured episodically near the edge of the field be related to exposure throughout the ecosystem? How will these findings be used to evaluate the potential for adverse impacts on aquatic life at the watershed level?

Many of these questions are answered in Part 2, however Part 2 is a separate proposal with a different set of applicants. Because there is only limited discussion of Part 2, how the research will be coordinated is unclear. A good example is the analysis of dissolved pyrethroid residues only, with a LOD of 0.2 mg/l in Part 1, whereas in Part 2, the applicants suggest that pyrethroids are primarily bound to sediment and dissolved residues may be low, on the order of 0.003 ug/l. In another example, the applicants in Part 1 plan to use EPA standard static renewal bioassay methods, whereas in Part 2 the applicants suggest that these methods are inadequate in justifying their use of in situ bioassay methods.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   For the level of funding sought, the amount of detail in the approach is marginal. However, given that there are most likely page restrictions, the information provided is adequate to evaluate the approach with regards to the likelihood of success. In the Executive Summary, the authors state Our goal is to address the problems source by identifying alternatives that can be implemented by orchard growers to significantly reduce or eliminate the off-site movement of pesticides used during the winter dormant season. In addition to meeting this grower education and behavior modification objective, the findings promise to broaden our understanding of the relationship between pesticide use practices, those factors that govern off-site movement with runoff, and the potential for adverse impacts on aquatic ecosystems.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   This proposal has both a research and outreach component. Measures of success of the research component will be significant new knowledge, i.e., the relationship between use pesticide practices and edge-of-field loss with runoff. Measure of success in the outreach component will be harder to evaluate. One measure is a broader understanding, by both researchers and stakeholders, of potential impacts of increased pyrethroid use on water resources in the Central Valley and delta regions of California. If study findings suggest the likelihood of unreasonable adverse impacts to aquatic ecosystems, the adoption of new pesticide use practices that have been determined to reduce pesticide runoff, i.e., reduced pesticide use, use of less risky pesticides, or use of pesticides in less risky ways, would be a measure of success. The proposal discusses in sufficient detail how these measures of performance will be evaluated. However, only with continued monitoring can the actual impact of outreach efforts be evaluated.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

Research and outreach products will consist of presentations, newsletters, publications, and reports. These products are important to the outcome and should contribute significantly to meeting the objectives of the project and also the performance measures described above.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The applicants have a strong track record based on past performance in their given area of expertise. The critical feature of this effort is that the research team has a broad scope of expertise, from engineering to pest management to limnology and ecotoxicology. In addition, there appears to be an appropriate infrastructure to leverage this diverse expertise to meet the objectives of the proposal.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Given the nature of this proposal, cost/benefit is difficult to evaluate. However, if the research and outreach objectives are achieved, as determined by performance standards, the funding sought is appropriate. It is safe to say that no other state has allocated funds for activities at this scale to address ecosystem restoration, so comparisons of cost/benefit expectations with other states are not possible.

Miscellaneous comments:

Prior Performance/Next Phase Funding:

New Proposal Number: 212

New Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   97-C12 Alternative Practices for Reducing Pesticide Impacts on Water Quality

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   XYes -No -N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes -No -N/A

   If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

   -Yes -No **X**N/A

   If no, please explain:

Other Comments:

Environmental Compliance:

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   XYes **-**No

   If no, please explain:

   No permits or environmental documentation needed.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   XYes **-**No

   If no, please explain:

   N/A

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 212

Applicant Organization: University of California, Davis

Proposal Title: Water Quality Effects of Pesticides Used in Orchard Agriculture - Part 1: Evaluating Management Alternatives and Off-site Movement

1. Does the proposal include a detailed budget for each year of requested support?

   XYes -No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes -No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes -No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes -No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   XYes -No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

6. Does the budget justification adequately explain major expenses?

   XYes -No

   If no, please explain:

7. Are there other budget issues that warrant consideration?

XYes **-**No

If yes, please explain:

Proposed Amount used Federal overhead rate!

Other Comments: